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EDITORIAL

The Industrial Situation

t has frequently been suggested that men trained in science, with accurate and logical minds—chemists for instance—could, if they only chose to take the necessary able lift the world from the trough of depression to the crest of the wave of prosperity. If the causes the depression could be ascertained infallibly by the ids of data that could be plotted on a graph or a few phs and if the remedies could be deduced from a dy of these and other data there would be some son in suggesting that the cure of the world's troubles uld be attempted, and indeed achieved, by those ined to think logically and scientifically: but we d that the political and economic ideas of a great ss of the population play so important a part in the line and progress of the industry of the community it the few definite data available sink into compara- e insignificance. The aspirations and prejudices of llions of people who have had no opportunity of dying economics cannot be ignored in a democratic intry or in countries supposed to be controlled by the sdom of almost divine Presidents such as now adorn United States and Germany. Such forces form an rwhelming proportion of the factors that guide our tinies, and chemists, astronomers, and physicists are more qualified to notice them and classify them ording to their relative importance than ordinary rtals. We have only to consider the events of the t year or so to find abundant evidence of these nmonplaces of contemporary history. Italy with a tatorship some fifteen years old has proceeded slowly ning wisdom and experience as year succeeded year; at her achievements have cost may be ascertained a study of her budgets during that period. In this intry during the same period we have made a number experiments, some on a small scale, once on a large le, none on a colossal scale. Most of these experi- nts have been costly and unsuccessful and many ople here are reverting to the old-fashioned beliefs t a gradual return to economy, common sense, and ieral sanity, followed still more gradually by a relief taxation will do more to make us good and happy n any quick-rich scheme that the most acute and usible person can devise. We have still a consider- e measure of liberty in this country and a great ersity of opinion is not only tolerated but welcomed. ery proposed experiment is criticised with vigour and picion and our changing policy about such matters is accompanied by, or caused by, a slight alteration in the equilibrium of several different attractions and repulsions. With a profound belief in our own and in other people's imperfections we are now watching with great interest and some scepticism two great experiments in the restoration of wealth and happiness to Germany and the United States. In this country practically everyone hopes that these two great nations will achieve wealth and happiness but at least two-thirds of us view these particular experiments with considerable mis- giving. So far as Germany is concerned we find it difficult to understand the state of mind that seems to exist there; we are ignorant of their ambitions and hopes. From time to time a prominent politician utters some extreme sentiments that fill our cautious minds with alarm and indignation; what the German people think about such utterances we do not know and we are not sure that the German people themselves know. We desire a prosperous and a pacific Germany; and the more patriotic the Germans are the better for them; we do not look forward to a Germany with advanced scientific and technical methods and mediæval notions of justice and humanity. We do not expect that Germany will develop into such a country; nevertheless some of her spokesmen are a little extreme or indiscreet or both. We should like Germany to prosper and engage in commerce with other countries that will be beneficial to all and the sooner this comes about the better for the world. At the moment we must be patient and we can only wonder what the experiment will cost and whether it will restore prosperity to Germany any quicker than our own less spectacular efforts. In America we watch a very different experiment, one that would have been as hard for the chemist to expect or is now as hard for him to estimate, as the great German experiment. The will of the community, expressed by the eloquent President, has been for a rise in prices: everybody intended a rise, expected it, bought on the faith of it, and achieved it. There is now a halt or a slower rate of advance; magnificent profits have been made, but how long the process will continue is not obvious. The most cautious people here think the advance has been far too rapid and that there will be much disappointment in the United States six months hence. We are not qualified to judge; who is? It will be very interesting in any case to learn, if we can, six months hence what these two great experi- ments will have cost and what will be the return for the expenditure.

Phenol and Benzol

Benzol, thirty-two million gallons of it, is produced each year in this country by the carbonization of coal either in coke ovens or gas retorts. Most of it proceeds *via the pump into our motor cars. A small proportion*, not more than ten per cent. in all, is used as a raw material for chemical purposes. The price of benzol is favourably affected from the point of view of the seller by the repercussion of the 8d. duty on hydrocarbon oils: it rises and falls with the price of petrol. The buyer of benzene for the purpose of converting it into nitrobenzene or aniline has thus to purchase a raw material the price of which fluctuates without warning and without any reference to its scarcity and which, so far as he is concerned, is burdened with the equivalent of the 8d. tax. *He is very definitely* at a disadvantage. Probably a similar set of circumstances affects the price of benzol in certain other *European countries, but it does not apply on the* American continent where there is an unlimited supply of low-priced benzol. There is apparently no spare *benzol on the Continent and it* is costly to bring it from America, but its cheapness there gives a price preference to aniline and to products made from it. There is thus a very definite problem as to how and at whose expense the dye-maker is to receive the assistance he asks for, the more particularly since he is pledged to supply his dye-wares at competitive prices with the foreigner. The producers of benzol claim it with justification as the one bright spot in an otherwise gloomy list of products derived from coal by distillation: without the revenue from it they would in many cases be forced to cease operations and it is said that they are in no position to make concessions to the dye-maker in regard to its price. Phenol is of growing importance as a raw material for synthetic chemicals and particularly for the manufacture of synthetic resins of the phenol-formaldehyde type. For some time its price was uneconomically low and its production from certain coal-tar fractions was not encouraged. A shortage has arisen, so much so that *free import is now allowed and the production has been* augmented almost to the maximum. Looking ahead, this production would not appear to suffice for the *future and there is little doubt that the manufacture* of synthetic phenol from benzol carried out during the war will have to be undertaken in England. Here again, the prime factor is the supply and the price of the necessary benzol. Dr. Levinstein has discussed this question at our annual meeting and it is evidently quite clear to him that our infant and flourishing synthetic resin industry is in considerable danger of receiving a serious and harmful check unless it has access to satisfactory supplies of low-priced phenol. Sir Henry Sutcliffe Smith, chairman of the Colour Users' Association, has been equally emphatic in his denunciation of the effects resulting from the high price of benzol, particularly on the primary dyestuffs intermediates where its incidence is greater than on the finished dyes. At present licences to import some of these intermediates have been given on price grounds. At the moment there is no obvious remedy for these anomalies though it is known that they have received anxious consideration by all concerned for some time past.

PHENOL SUPPLIES AND CELLULOSE*

By DR. HERBERT LEVINSTEIN, M.Sc., F.I.C., M.I.Chem.E.

Cellulose

The consumption of wood in the world is greater than *the annual increment by natural growth*, and the chief industrial countries have been except latterly increasing their rate of consumption of wood, in particular of soft wood. In the United States the soft wood forests were originally estimated to contain 875,000 million cb. ft. of available timber. Less than a third of the original quantity now remains, and in Canada a similar reduction has taken place. The annual consumption in the U.S.A. of soft wood, and the U.S.A. is much the largest consumer though it has recently diminished owing to the slump in trade, is of the order of 25,000 million cb. ft. of wood, of which about 50,000 million board feet are used as saw timber. The annual total growth of timber in the U.S.A. is estimated at only 6500 million cb. ft., *of which about 10,000 million board feet are saw timber.*

It is known that at the present rate of consumption and with the present forestry methods the available *soft wood supplies of these two countries* will be exhausted within the lifetime of the present generation. There is no doubt that wastage could be checked, but it is said that these two great timber-producing countries may soon become importers rather than exporters of soft wood. Whether or no this will happen in fact depends largely on the building trades. We have to reckon further with the abnormal wastage which occurs from time to time through huge forest fires. In any event the greatest reserves of soft wood in the world are to be found in Russia, a matter of political as well as of economic importance. It is difficult to get accurate statistics of the total production of soft wood in the world. I think one can assume that the total production is about 800 million to 850 million tons, and that about 40 million tons are used for the production of wood pulp.

There is no reason to fear a shortage of wood pulp; the natural growth of existing forests is amply sufficient but for the voracious building trades which use seven times as much wood as that used for making pulp. The consumption of wood for building purposes, which *was rapidly growing until the slump, will no doubt have* to be permanently curtailed. As the consumption of wood for building diminishes, the supply of wood for *making pulp for paper, artificial silk, and plastics* becomes in the absence of any new factor automatically more secure. There is an additional security in that in a properly managed forestry system, as for example that in Sweden where there are 55½ million acres of forest no wood is cut primarily for the pulp mills. Thinnings which have to be made in the forest, poorer logs, and saw mills waste are there the materials used for the making of wood pulp. Thus the making of paper pulp is in Sweden, and no doubt ought to be elsewhere merely a by-product industry, which should make no inroads into the world's stocks of growing timber.

At the present moment the consumption of wood pulp outside the paper trade is relatively small, as the following figures show:

* Read at the Plastics session during the Annual Meeting of the Society in Newcastle, 1933.

Estimated world production, 1932

	Tons
Artificial silk	231,000
Celluloid (roughly)	40,000
Phenolic resins (roughly) . .	40,000
	311,000

The total consumption of wood pulp, including wood ..al. throughout the world for these industries is only ..ut 2% of the total production of pulp.

It seems clear from the above that the potential ..pply of cellulose for synthetic resins and artificial silk assured, even if these industries were to consume 10, .. or even 50 times as much as they do to-day. No ..ubt the consumption of phenolic plastics will increase. ..w much, no man can foresee. The increasing use of ..ywood is diminishing the consumption of timber in ..rtain branches of the building trades. Steel joists .. reinforced concrete will no doubt continue to replace ..e use of wooden joists; floors will be made with many ..lling materials; or plastics in one form or another for ..rniture, doors, and other requisites for building and ..rnishing will come into increased use until the con..umption of wood suitable for building no longer exceeds .. annual growth.

For many purposes, *e.g.*, in ships, in aeroplanes, and ..heatres, the use of panels made of laminated plastics ..hich are as strong and light as steel and have infinite ..apacity for decoration, is especially attractive on ..count of their non-inflammable character. It is quite ..ossible, I am told, to replace timber mass-produced ..roducts by mass-produced moulded or pressed plastics. ..onsider the production of doors: possibly not a good ..xample. It is an example taken almost at random. ..he number of doors used in this country in the course .. 1932 by the building trade amounted, so I am told, ..o 2,400,000, of which one-half was imported. Of these, ..he greatest quantity are cheap imported doors used in ..overnment subsidized houses, costing 12s. 6d. a piece .. the rough, and about £1 when painted and varnished. ..ut in better-class houses, for example, of the £1000 ..ype, the cheaper doors cost from £2 10s. to £3 each, and ..ush doors, painted and varnished and made of hard ..ood, cost as much as £8 or even £10. A phenolic ..lastic laminated door, including framing and veneering, ..nished ready for erection, costs £6 6s. Of this sum .. 10s. is represented by the phenolic plastic. We have ..ere already a cost which compares favourably with ..ard wood doors of the more luxurious type. A plastic ..oor may look better than a polished mahogany door, ..nd it costs less. With mass production, the cost would .. very much reduced, as is shown in the summary of ..sts given below.

If phenol were available at 5d. a lb. and the cheapest ..ethod of construction were used, *e.g.*, angle iron fram..ig, faced with a laminated plastic and filled with ..undproof packing, doors could be produced for about .., or less.

*Summary of the costs of doors manufactured in this country**

	£	s.	d.
..dinary panelled door made in this country	2	10	0
..ush door in hard wood (oak etc.) varnished and painted	8	8	0
Moulded, laminated phenolic plastic door, if mass produced, with phenol at 5d. per lb., (estimated) .	3	0	0
Bakelite laminated door, wood frame, flushed and veneered, made singly, with phenol at 9d. per lb. .	6	6	0

* Private communication from Mr. H. V. Potter.

Clearly there are possibilities here as there are in countless other branches of industry for a much-extended use of plastics. In so far as cellulose is concerned the potential supply is there.

Coal-tar Phenol

Very different is the case with the supply of phenol, which has in the last 30 or 40 years been subjected from time to time to wide fluctuations in price caused by either a temporary surplus or shortage of supply. The price of phenol at the moment is about 9d. per lb. The normal price may be taken as averaging between 5½d. and 6½d. per lb. in this country. But as far back as 1888 the price of coal-tar phenol was at least as high as it is to-day. Picric acid then made exclusively from phenol had been introduced as a high explosive, for use first by the French and later on by other armies. This new military use for phenol caused an acute shortage for industrial purposes. The industrial consumption of phenol at that time was chiefly in Germany, where the manufacture of salicylic acid was already of considerable importance. Maybe the German dyestuff makers were tempted in 1888 or 1889 to make synthetic phenol by fusing benzenesulphonic acid with caustic soda. If so, it was well that they resisted the temptation. In 1890 the first demands of the army had been satisfied; coal-tar phenol supplies again became adequate, the price fell to 5½d., and we may assume that synthetic phenol ceased to attract. At any rate the Germans continued to use coal-tar phenol made, for the most part I believe, in Germany from imported English tar acids. Dr. Raschig was prominently connected with the early manufacture of synthetic phenol, and gives an interesting account of this early work. (Chem. Zeit., **50**, 1003, 1896.) Ten years later, during the Boer War, the export of the tar acids, of crude or pure phenol from Great Britain was prohibited. There was again a shortage. All the British tar acids were required to produce phenol for the manufacture of lyddite. The supply of English tar acids being cut off, the Germans were obliged in 1900 to install synthetic plants.

In the early days of 1919, when I went through the Rhineland factories with Brig.-Gen. Hartley's Mission, I had the task of inspecting the large dyestuff factories in that zone from the military point of view, with instructions carefully to avoid examining any plant which had only a peace and not a wartime utility. The manufacture of synthetic phenol and of beta-naphthol are similar. One large building I found closed. It was stated to contain a beta-naphthol plant and access was refused on this ground. I thought it might be a synthetic phenol plant, and asked to see the beta-naphthol stills, which could easily be distinguished from phenol stills. There were no beta-naphthol stills and I therefore inspected the plant which turned out to be, in fact, a synthetic phenol plant. Perhaps it had been designed by Dr. Raschig himself, for it was stated to have been installed during the Boer War.

Let me return to the present-time market conditions for coal-tar phenol. *In August and September of last* year 60's phenol was selling at 1s. 8d. per gallon. Supplies barely balanced the demand. For this, the growing demand for the phenolic resins was the cause. That is a very different matter from the spasmodic shortage of phenol *which has occurred from time to time* in the past through military demands for warlike purposes. Here is a new industrial use of phenol, bearing witness by its effect on the phenol market to its growing importance. This is a use of phenol to be welcomed by the League of Nations, and by all of us interested (and who is not ?) in the transformation by chemists for industrial purposes of nature's raw materials. But the effect on the phenol *market was not the less drastic for these considerations*. The purchase for France and Germany of 100,000 tons of crude coal tar was sufficient to turn the balance and create an acute shortage of crude phenol. The price jumped first to 2s. 3d. and then to 2s. 6d. per gallon. *By January of the present year the price reached* 3s. to 3s 6d. per gallon. The Convention of Phenol Producers had, I believe, sold pure phenol to the end of *1932 at* 5¾d. to 6d. per lb. With *this shortage* of crude phenol, what were they to do? They got together and put the price of pure phenol up to 9d. per lb.

The following table shows the average price of phenol during the preceding years:

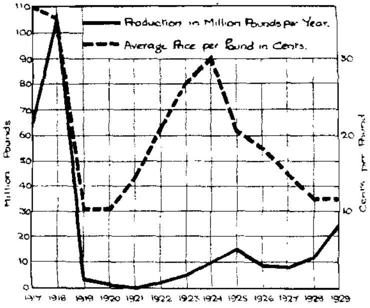
1929	6¼d. to 6½d.
1930	7d.
1931	6d.
1932	5½d. to 6d.
1933	9d.

On March 15 *of this year in order to help the market* synthetic phenol was put on the K.I.D. free list, but the importation of synthetic phenol from America appears to have done little to help the price. In March and April of this year the U.S.A. price was 11¼ cents c.i.f. which, with the 10% duty added, works out at about 9d. per lb. delivered. With the fall in the exchange value of the dollar, the dollar price has been increased, keeping the *amount to be paid in our money* for the American product about constant. As I write the New York dollar exchange is 4·49, and the price of phenol in America is 14 cents, or 7d. at par. What a tangle is caused by these fluctuating exchanges! I am informed that, *for the first time for many years, American natural* phenol has just been offered to English buyers, the price being 8d. c.i.f. equivalent to 9d. duty paid and delivered.

Synthetic Phenol

During the war large quantities of synthetic phenol were made in this country, but there is none made at the *present moment, nor is the manufacture carried on in* Germany to any substantial extent, if at all. The home of the synthetic phenol industry is America, where benzol is cheap because petrol is cheap.

It would appear that the time is now ripe for the manufacture of synthetic phenol to be taken up in this country. The plant is simple, the process is well known and affords an admirable outlet for caustic soda, and also for either sulphuric acid or chlorine. In America 80% of the phenol produced is now made synthetically; the two largest producers are the Dow Chemical Company, which uses monochlorbenzene as its starting-out product, and the Monsanto Chemical Company which uses the sulphonic acid method. The total production and cost curves for the period of 1917 to 1929 of phenol in the U.S.A. are shown in the following diagram. (Chem. & Met. Engineering, August, 1930, from the United States Tariff Commissiou, "Census of Dyes and other Synthetic Organic Chemicals.")



Production and cost curves of phenol for the period 1917—1929

It will be seen that in 1918, the last year of the war, the total U.S.A. production reached nearly 107,000,000 lb., *approximately 47,000 tons; and that the production*, after falling away to practically nothing, rose again in 1929 to 24,177,000 lb., approximately 11,000 tons.

The cost of producing synthetic phenol here if benzene were the same price in England as it is in America, would be about 4d. per lb., whether the chlorbenzene or the sulphonic acid method were used. Both methods work well. The choice must be determined by the plant available. One must consider too whether it is more desired to dispose of sulphuric acid than of chlorine.

Synthetic phenol would without doubt be a very good article to make in quantity, to sell at 5½d. per lb., were the price of benzol as cheap here as in America, and were *the price of coal-tar phenol not subject to such fluctuations*. But the market outlook is not the same now as in 1890. The increase in the phenol consumption is not likely to be spasmodic as in the case of a war product. There is sure to be, if the price is right, a constantly growing demand. One must, however, remember that the scarcity of coal-tar phenol is partly due to the slackness of the coking ovens which, I am glad to say, are *now increasing* their activity. Then the American production of natural phenol is obviously capable of development. If the dollar becomes much dearer in terms of sterling, American production of coal-tar phenol may unexpectedly affect our market.

Further, there is in total a considerable phenol content in the crude ammonia liquors from gas works and coke-oven by-product plants, which at the present moment is not recovered. Finally, one must bear in mind that a gallon of crude tar acids contains 4½ lb. of cresol as well

lb. of phenol. If the cresols were to be substituted phenol by the manufacturers of plastics, the price phenol would come down. Indeed, the impossibility these by-product cresols is partly the cause of high price of coal-tar phenol in this country. In the consumption of cresylic acids in the U.S.A. 12,500 tons, of which 4500 tons were imported. The industry of the U.S.A., I believe, buys much more than phenol, using a mixture of cresols in which the isomer predominates. Here, as is well known, the portion of cresol used has been very small. I do not whether the difference between American and British practice lies in the type of resin produced or in quality of cresol available, but the fact cannot be by a firm contemplating the erection of a synthetic plant. Despite these considerations, I am of opinion that the manufacture of synthetic phenol should be taken up in this country on a moderate scale at first. Existing plant can readily be adapted, and every effort should be made to secure from the Government concessions which would enable the new industry to have its benzene under the same natural conditions as the Americans.

Estimated consumption of phenol in Great Britain for 1933

	Tons
For the plastics trades	3000*
For salicylic acid	1200
For dyestuffs, disinfectants, etc.	800
Total	5000

* It seems quite likely to-day that, owing to the high price, the consumption of phenol for the plastics trade in 1933 will fall short of the original estimate of 3000 tons and may possibly not reach more than 2000—2250 tons.

The home production for 1933 will, it is estimated, amount to 5000 tons. The consumption of phenol for plastics in 1932 was substantially less, viz., about 2000 tons. It is reasonable to assume that had the price of phenol been normal the consumption in 1933 would have been substantially greater than the estimate given above. Given a free supply of phenol at a price of about 5½d., it may well be that the phenolic plastics will take their place as a material of great world importance.

Clearly coal-tar phenols and cresols do not offer a sufficiently assured supply to permit of great development. The quantity of synthetic phenol which can be produced and its cost price depends on the supply and the price of benzene. As benzene is also a by-product it is not available in an unlimited quantity.

The following figures show the production of benzene, C_6H_6, in 1931 :

	Imp. gal.	Tons
U.S.A.	73,500,000	260,000
Germany	45,500,000	163,000
United Kingdom	17,500,000	63,000
France	13,650,000	48,000
Belgium	5,775,000	26,000
The Saar	5,425,000	19,500
Czechoslovakia	4,550,000	16,200
Holland	3,850,000	14,000
Poland	3,325,000	12,000
Italy	875,000	3100
Spain	647,500	2300

I would like you also kindly to consider the following production figures :

U.K.

1932	Gal.	Tons
Crude benzol	48,000,000	170,000
Motor benzol	25,000,000	90,000
Used in chemical industry (estimated)	2,500,000	9000

It follows that the possible production of benzene in the U.K., if all were recovered and none were used as crude or motor benzol, would have been 150,000 tons. One ton of benzene yields about its own weight of phenol. We have thus available in this country enough benzene to make 20 or 30 times the quantity of phenol now obtained from coal-tar acids.

The petrol imports in this country amount to nearly 3½ million tons, which is about 25 times the total amount of benzene that we can at present produce. It is nearly 60 times the amount of benzene which we actually produced in 1931. From this it is evident that the national importance of home-produced benzene as a motor fuel is, and must remain, comparatively insignificant. It is of much greater national importance to encourage the use of benzol in the chemical industries, such as the dyestuffs industry, or in a new industry such as the plastics, for by so doing we employ plant, labour, capital, and relatively large quantities of heavy chemicals. The development of the plastics industry on a large scale, using British benzol as its main raw material, would be of great importance to all interested in the disposal of sulphuric acid, or chlorine, and of alkali. The development of the manufacture of an organic chemical in quantity is the most dependable, as it is the most profitable and intelligent way of expanding the market for the heavy chemical industries. The conditions seem favourable for developing here an industry already becoming a large one in the U.S.A., but for the duty on imported motor spirit.

Duty on Imported Motor Spirit

The duty on imported motor spirit amounts to 8d. a gallon. The retained imports into the U.K. were :

	Imp. gal.	Tons
1930	955,000,000	3,440,000
1931	905,000,000	3,230,000
1932	974,000,000	3,480,000

The amount realized by the Treasury from a duty of 8d. a gallon on nearly a thousand million gallons, nearly 3½ million tons, is obviously substantial. It forms to-day a contribution to the Budget which cannot lightly be jeopardized. But surely it is not impossible to devise a method for collecting this important revenue without putting up the price of the 2½ million gallons of benzene, the comparatively insignificant quantity of 9000 tons of benzene estimated to be used in the chemical industry. The Treasury has but a slight interest, if any, in advancing the price of benzol used in the chemical industry. It is true that to the above extent it replaces an imported motor fuel and thereby helps to diminish imports and to help in the balance of trade. It is further true that the extra 8d. a gallon on benzol is in effect a subsidy of 4s. per ton of steel produced in this country. So at least it is said. But why should the chemical industry be asked to pay a subsidy of 4s. per ton to the steel maker ? If it is desirable, and I believe it is desirable, to subsidize the coking industries and the

iron and steel industries to this degree, let the subsidy be paid by the State. Let it be spread evenly over industry. Above all, let us not strangle an infant industry in order to pay a subsidy to a full grown, if hard hit, trade.

It is common knowledge that the Treasury is adamant when approached with any proposals to help a small industry if there is any loss of revenue involved. It would, however, not be difficult to devise a method for removing this burden on industry without any loss of revenue. It may be that there are weighty arguments against an 8d. duty on imported motor spirit. Whatever these arguments are, they have been pleaded in vain. Why not increase the duty from 8d. per gallon to 8·1d. per gallon? I cannot imagine any argument which was unsuccessfully pleaded against the imposition of an 8d. duty being successfully pleaded against an increase to 8·1d. yet the amount realized by this trifling increase would be sufficient to give a rebate of 8d. per gallon for more than five times the quantity of benzene used in the chemical industry in 1932.

It should not be difficult to administer a system of rebates or bounties were they restricted to the benzene used in the manufacture of the three mono-substitution products: monochlorbenzene, mononitrobenzene, and benzenesulphonic acid. 8d. a gallon added to the price of benzene adds slightly more than 0·8d. per lb. to the cost price of aniline oil, and 1d. per lb. to that of synthetic phenol. I hope that we shall avoid a repetition in the case of the industries dependent on benzene of what happened to those dependent on cheap alcohol. The duty on alcohol killed the manufacture of all ethylated dyestuffs or any products requiring the use of alcohol in this country. Many of you remember the long years it took to persuade the Treasury to relax its restrictions. Even then, but for the requirements of the Government itself for its cordite, I am doubtful whether we should have been successful. But trade once lost is not readily recovered. We at Blackley never took up again the manufacture of the dyes whose production had been abandoned in the 80's. The trade was in the hands of the Germans. They had written off their plant, they had a large production, and there was no tariff. It would have been absurd seriously to take up the manufacture years after the cream had gone and to re-commence a competition which would clearly have been unsuccessful. No! Trade begins where conditions are favourable; where there are no restrictions. After a lapse of years, a new trade has become well established, markets have been secured, first profits have been made, and prices have been reduced. It is no good then to take off these restrictions and to hope that trade will come back. It is too late. With a tariff you may perhaps recreate a certain amount of trade in the home market, but you will never get what is really important, a world trade, a fair share of the world's market.

This concludes my short and general survey of the phenol and cellulose resources available for the plastics industries. It is far from complete, but I hope that it contains some matter that may be of interest to you.

Discussion

Dr. L. A. Jordan, after thanking Dr. Levinstein for his thoughtful, critical, and statesmanlike address, said that the duty on white spirit and turpentine had an interesting connexion with the plastics industry. For example, turpentine was a raw material for synthetic camphor; synthetic camphor meant celluloid, and celluloid was a plastic. But he was not sanguine about the authorities seeing reason with regard to the duty.

Mr. H. Talbot emphasized the importance of obtaining figures upon which to base arguments and form policies from almost every country likely to be concerned with the particular activity with which one was dealing. the League of Nations organization was building up an economic and statistical service which would in time, he believed, produce figures valuable for this purpose. He felt there might have to be some internationally planned economy to deal with industries applicable to the majority of civilized nations in the world; then the information provided by the Economics and Statistical Branch of the League of Nations would form the basis of any action decided upon. Commenting upon Dr. Levinstein's remarks concerning synthetic phenol, he said he had come to the conclusion that the minimum time lag between knowing that we ought to do something and being able to do it, in this country, was about 12 years, and sometimes it amounted to 50 years. If the Society happened to meet in Newcastle in 1953, probably by that time the authorities would have decided to do what Dr. Levinstein now asked, by which time all the business would have been obtained by America.

Mr. Grant Hooper, discussing supplies of cellulose, suggested that possibly in future we might have to consider "home-grown" cellulose. It had always seemed wicked that we should sacrifice a tree, which took years to develop, when we could grow cellulose at home quite readily. He understood that one company had found it profitable to devote attention not to the production of such cellulose as was indicated by wood pulp, but rather to the production of fibres, which commanded a much better price. He also asked why cresol was not used more largely in the production of plastics. It seemed quite possible that the direct use of cellulose, plus a plastic, presented opportunities which so far had not been developed.

Dr. F. H. Carr joined in the discussion for fear that some of those attending the meeting might be depressed by what had been suggested as to the possibilities of influencing the Treasury to act with regard to the duty on benzol used in the chemical industry. He had been greatly impressed by Dr. Levinstein's address, and most of all by his remarks concerning the conception, gestation, birth, and wet-nursing of industries of fundamental importance, and the point that because we were slow to get off the mark we did not come in at the end. He urged that it was up to the chemists to bring this matter before the public over and over again so that our legislators might be forced to understand it. Through the Council of the Association of British Chemical Manufacturers and other organizations, representations had been made repeatedly, through the proper channels, concerning the benzol duty; but without effect. The placing of common-sense arguments and facts before the public, in such a trenchant way as Dr. Levinstein had done, was a better method of educating than deputations to the Treasury or the Board of Trade: we should utilize that better method more than we did,

should not be tempted to give up the chase by ...on of rebuffs. For example, although much time been devoted to efforts to persuade the Government ...elax restrictions on alcohol, apparently without ..., ultimately and almost by a stroke of the pen ...nd the scenes, the difficulty had been overcome. ...were fortunate in having such people as Sir Robert ...rtson, the Government Chemist, able to put ...ard the common-sense view to Government ...mittees.

...ajor Knowles, who was critical of some of Dr. ...nstein's figures concerning the consumption of ...nol in this country and the trades using it, said that ...shortage of supplies during the last two or three ...s had not been confined to this country, but had been ...national, and one reason for it was that the Japanese been in the market for unprecedented quantities. ...what purpose they needed it he would leave others ...guess. It was to the credit of the English makers ...t they did not supply any of it, but kept it at home ...home users. The supplies to Japan came from ...ntries who had declared that politically they could ...possibly support Japan. One reason for the trouble ...ch had occurred was the effort of the phenol makers ...support the plastics trade; they had attempted to ...p the price of phenol at a level which they had ...ught would help the development of the trade. ...ther cause of shortage in the early part of this year that because the selling price of phenol in England ...the lowest in the world in 1932, the raw material ...ired for phenol had left this country for others in ...ch more was being paid for it; and protective ...sures had had to be adopted to keep the raw ...erial here. Phenol was an international product must be considered on the gold basis, and when the ...e here was 9d. it was about 7d. in world markets. ...s the increase was not due to the makers of phenol ...he suppliers of their raw materials; it was an increase to the fact that the product must be placed in the ...ld markets at world market prices. He represented ...ompany which made both natural and synthetic ...nol; if phenol were required, we must have it, ...ther it was natural or synthetic, but we must be ...ful in deciding when the time was ripe for the ...nufacture of synthetic phenol. The plastics trade short of phenol towards the close of last year, but ...ust be remembered that in the last two months of year the trade had asked suddenly for as much as ...ad asked for during the previous twelve months, so ... an exaggerated sense of shortage had arisen. The ...and by the plastics trade last year was practically ...plied, he believed, by the British makers, and at moment he did not know of a plastics maker who in the market for phenol. After representations, ...hetic phenol was taken off the K.I.D. list. During representations it was suggested that there was a ...tage of 700, 800, or 900 tons of phenol. The imports ...lting from the removal of the duty however, were ...roximately between 120 and 150 tons, and that ...d be explained by the connexion between a firm ...his country and a firm abroad. It has not been ...ed, therefore, that there was a shortage, and he not prepared to accept that there was a serious shortage. Whether or not supplies of phenol in this country could meet demands, improvement in the steel trade and in trade generally would bring the balance on the other side. The factor which worried people in this country was the price, and if they admitted that we could get further. Who would embark upon a synthetic phenol plant to supply a doubtful shortage of 100 or 200 tons, being able merely to sell the synthetic product after the natural phenol had been sold? There was no definite indication in this country that there would be a sale for the quantity of synthetic phenol which could be produced economically. The natural phenol might be sold at a reduced price, and would sell first, and the synthetic phenol makers would be left with their product for sale after the natural product.

Dr. Levinstein, in a brief reply, said he had made no attack on the phenol makers, nor had he said that there had been a serious shortage. His figures were obtained from authoritative sources, and he must regard them as accurate; if they were not, then he hoped that any inaccuracy would be indicated.

THE COLOUR USERS' ASSOCIATION

Presiding at the annual meeting of the Association, held in Manchester on August 1, 1933, the chairman (Sir Henry Sutcliffe Smith) said:—

I feel considerable diffidence in addressing you to-day, as since we last met the Dyestuffs (Import Regulation) Act has once more been extended and the Government has referred the whole question to the Import Duties Advisory Committee for their recommendations as to future action, and, therefore, until a final decision is arrived at, I think it advisable to confine myself to-day to a review of our work during the past year.

Once more I wish to convey my sincere thanks to the Council and the members of the Standing Committees, who have devoted themselves so energetically to furthering the interests of the Association.

For the twelfth successive year, Mr. G. E. Holden, our honorary technical adviser, has rendered most efficient service both as Joint Technical Adviser to the Dyestuffs Advisory Licensing Committee and as a member of the Joint Technical Committee—the latter composed of members of our Association and representatives of the makers. Mr. Green and his staff, as usual, have carried out their duties in a highly satisfactory way.

Dyestuffs Industry Development Committee

Last year the Dyestuffs Industry Development Committee issued another report on the position of the Dyestuffs Manufacturing Industry in 1932 [their previous report having been made in July, 1930 (Cmd. 3658)] and this was presented to Parliament in November, 1932 (Cmd. 4191).

The views of your two representatives on this Committee differed so widely from those of the majority, who are mostly dyeware makers, that they were unable to sign the general report. After consultation with the Association, they submitted a separate memorandum stating a case against the continuation of the Act. The majority recommended "that the Dyestuffs (Import

Regulation) Act, 1920, be continued on its present basis for a period of three years," and two of the members signing recommended that the period should be five years. Your representatives, on the other hand, recommended that the Act should be allowed to lapse at the specified date, December 31, 1932, and their views are embodied in the report.

British Colour Council

Perhaps you will allow me at this point to direct attention once more to the work of the British Colour Council, of which I have the honour to be President, whose object of placing colour determination for the Empire in British hands is one deserving of the support of all colour users. The Council is sparing no effort to assist colour users by effecting a reduction in the number of colours used, and is endeavouring to eliminate the confusion which at present exists in the matter of colour nomenclature. This work should be of the greatest service to all organizations using colour, if only from an economic standpoint. It is the intention of the Council to issue shortly a standard shade card, and this will be supplemented from time to time by further cards giving the season's shades.

British Dyestuffs Industry

In addressing you last year I referred to the marked increase in the production of British Dyestuffs in 1931 compared with 1930, the figures then quoted showing an increase of 12½%. The revised figures recently published by the Board of Trade show that the increase of 1931 over 1930 was actually 14%. The published figures for 1932 show further progress, recording an advance of 1½% compared with 1931. I have here a table giving the production in 1913 and for each year from 1922 onwards, showing that last year the manufacturers achieved a production of more than five times the pre-war figure and nearly 2½ that of 1922.

	lb.	Index figure
1913	9,114,134	100
1922	20,802,563	228
1923	33,100,719	363
1924	33,242,704	365
1925	32,693,402	359
1926	30,297,000	332
1927	39,551,756	434
1928	50,907,080	559
1929	55,785,032	612
1930	42,590,243	467
1931	48,621,073	533
1932	49,380,266	542

I am glad to notice that Imperial Chemical Industries, Limited, is continuing its policy in the field of research. I observe that not only in the organization itself, but also in its relationships with the universities and other research bodies, there is a continuance of the excellent work which was begun some years ago.

I do not know that I can point to any particular outstanding discovery which has been made in the dyestuffs industry during the past year, but a number of new and useful colours have been produced. In particular I would mention the vat and acetate silk colours. There has of course also been a number of other new products of interest to us which, although not directly connected with dyestuffs, are of great value to the country, in particular to agriculture and to the textile, rubber and varnish industries. I desire to congratulate the dyestuffs industry most heartily on these achievements, and to pay a sincere tribute to all the British manufacturers, not only for their excellent service and high technical skill, so freely placed at the disposal of the colour users, but also for the high standard of quality of their productions.

British Dyestuffs Exports

As will be seen by the following table, the value of exports of dyestuffs and intermediates in 1932 exceeded the high figure recorded in 1931 :

Year	Weight Tons	Value £
1913	2434	177,246
1925	5208	847,639
1926	3793	614,419
1927	3892	658,464
1928	5199	806,533
1929	7844	984,222
1930	5381	884,974
1931	5864	1,016,238
1932	5850	1,039,087

It is gratifying that British makers are realizing more and more the importance of increasing their share of world trade as is shown by these export figures. There is no reason why Great Britain should not be one of the leading producers of dyestuffs for the world's markets, having in mind her valuable source of raw materials and her undoubted skill in organic chemistry. Without an adequate share of world trade, British producers are adversely affected in comparison with their foreign competitors.

Research

It is at all times difficult to estimate the beneficial effect of research work, as only those directly interested realize the full value of the activities of research laboratories. I have often referred to the usefulness of co-operation between chemical research laboratories and industrial undertakings, and it is a great pleasure to me to congratulate Prof. G. T. Morgan, O.B.E., D.Sc., F.R.S., of the Department of Scientific and Industrial Research, on the fact that the ether extractor, to which I referred last year, has proved a commercial success. Messrs. L. B. Holliday & Co., Ltd. have made great headway through its use and have been able to meet all demands for resorcine, both for technical and pharmaceutical purposes.

We have further evidence of the usefulness of these various research bodies in the production of "Shirlacrol," a wetting-out agent, resulting from investigations at the Chemical Research Laboratory on the chemistry of low-temperature tar and vertical retort tar, which Prof. Morgan and the British Cotton Industry Research Association at Shirley Institnte have recently introduced to the trade. There are however still many important intermediates imported, and these research associations are doing valuable work in inducing British manufacturers to extend their productions. I have repeatedly drawn attention to the danger of the importation of intermediates for the making of dyewares, and any method which these research associations can devise that would simplify the process of making

intermediates would be a most valuable service to the making industry. The country which controls the intermediate situation has the production of dyewares at its command.

British Production of Benzol

It is to be noted with regret that phenol has been allowed to be imported recently in quantity into this country. If the quantity produced by the domestic coal-tar distillation industry is not sufficient for the expanding demand of the plastics industry in this country, it is surprising that the dyestuffs industry has not been encouraged to supply the synthetically produced phenol. Phenol, as you will know, is the starting point for picric acid or lyddite—an explosive. It was made synthetically from benzol in huge quantities during the world war by British Dyes, Ltd. and others. Seeing that it is the settled opinion of the Government that for national security it is essential that synthetic colour-making factories should be in existence and be maintained in operation with their staffs of chemists and other experts in this country, this importation is to be deplored. Whilst there is a peace-time demand for a product necessary for a war explosive, a demand which would profitably keep plant in being and provide chemists with that experience thought necessary by the Government for national security, the petrol tax imposed by the Government makes the price of the home-produced benzol so high that it is impossible to make the synthetic phenol from it at a reasonable competitive price. This is another striking example of the vicious incidence of the petrol tax in the dye-making industry. The result is that money is leaving this country for importing phenol instead of providing employment for British workmen and the necessary experience for British chemists in making a product which is vitally important for national security. In addition to providing employment in the chemical industry, an extension of the prodnction on the lines I am now advocating would assist the coal industry. Has not a precedent for special consideration by the Government been established by the preference recently announced to be given to the home production of light hydrocarbon oils ?

Dyestuffs Imports

The statistics kindly furnished to me by the Board of Trade show a decrease of over 20% in the quantities and values of dyestuffs and intermediates licensed for importation in 1932, compared with 1931. The reason for this decline is owing to the fact that towards the end of 1931 very important changes took place in the economic conditions of this country. Between September and the end of the year, imports increased very considerably, and I find that in the last quarter of that year their value exceeded the average for the previous quarters by nearly 50%. When, however, the full effect of the abandonment of the gold standard was felt, and higher prices came into force at the beginning of 1932, imports dropped to the normal level again. It will therefore be seen that imports have been remarkably consistent in weight and value during the last six years. For the last few years these imports have consisted almost entirely of dyestuffs not made in this country, and as and when the British makers extend their range and the foreign colour becomes automatically prohibited, it is vitally necessary for the German and Swiss makers to place on the market some new dyestuff or speciality if they are to maintain their level of exports to this country. In so far as they succeed in accomplishing this object, they give definite evidence of the progressive methods employed by them.

The following table gives a complete list of licences granted for the importation of dyestuffs and intermediates over the past 12 years :

	Licences granted							
	For importation from Germany		For importation from Switzerland		For importation from other sources		Total	
	lb.	Value £	lb.	Value £	lb.	Value £	lb.	Value £
1921	671,032	197,466	1,796,754	763,299	209,719	82,056	2,677,505	1,042,821
1922	1,325,671	375,675	1,638,235	694,740	270,987	33,404	3,234,803	1,103,819
1923	1,817,571	493,499	1,412,616	459,861	461,253	36,177	3,691,440	989,537
1924	1,805,145	398,226	1,191,931	363,513	39,158	9204	3,036,234	770,943
1925	2,175,262	334,749	1,157,270	307,754	66,522	9081	3,399,054	651,584
1926	2,949,858	599,157	1,190,951	333,448	91,778	11,402	4,232,587	944,007
1927	3,644,152	710,938	1,230,815	306,595	115,389	16,480	4,990,356	1,034,013
1928	3,534,935	729,393	1,373,226	335,226	122,350	9494	5,030,511	1,074,113
1929	3,899,412	743,951	1,787,796	402,788	127,069	11,385	5,814,277	1,158,124
1930	3,774,882	712,946	1,506,996	360,252	248,605	14,331	5,530,483	1,087,529
1931	4,123,153	837,960	2,191,109	519,909	158,641	14,259	6,472,903	1,372,128
1932	3,542,175	668,840	1,270,164	393,031	293,950	23,078	5,106,289	1,084,949

The number of licences dealt with by the Licensing Committee in 1932 aggregated 5479, as against 6822 in 1931 and 6000 in 1930. It is interesting to know that 94% of the applications received were dealt with within four days of receipt. I regret to say that notwithstanding the revised procedure adopted by the Licensing Committee in 1931 as regards applications on price grounds, whereby foreign quotations are divulged only to neutral members of the Committee, the effect which the users anticipated has not materialized—foreign quotations for " contentious " colours are still withheld from the British user.

Once more I should like to place on record the users' high appreciation of the valuable assistance given by the German and the Swiss group of manufacturers, not only for the introduction of many new fast dyes and important auxiliary products, but also for the knowledge, technical skill, and service so efficiently placed at the disposal of users.

Dyestuffs Prices

Last year, you will remember, I made a protest against the very considerable advance in prices made by the

British makers at the moment when we were making great efforts to reduce our production costs. Dyestuff prices are out of conformity with world wholesale prices; the index figure for dyestuffs still remains approximately at 200, as against the Board of Trade wholesale commodity index figure of 101·7 (June, 1933). I am well aware that industrial prosperity will not be restored until wholesale prices have been substantially increased throughout the world, but each section of the trade is so interdependent that it is hardly equitable that any one component part of our cost of production should be far in excess of the general level.

I also quoted various statements by leading politicians that we were to have dyestuffs at no higher prices than those ruling in foreign countries. Since then, as you are all aware, the foreign makers refuse to quote for dyewares which are being produced in this country, and therefore it is impossible for British users to ascertain whether the price of domestic production is competitive with that paid by their competitors abroad.

I am pleased to note that since our last meeting Group IX of the Association of British Chemical Manufacturers, on November 17, 1932, passed a resolution asking its Council to "notify the President of the Board of Trade that the dyemakers have undertaken to sell their dyewares at a world's price, in spite of the fact that they have to pay 8d. per gallon more for benzol than their foreign competitors." This resolution was confirmed by the Council, and representations to this effect were made to the Board of Trade.

I do not propose to say anything further with regard to this subject, except that the colour-using industries, whose productions bulk so largely in the exports of this country, must be assured that they are not handicapped in their efforts to compete with other nations. There is an undoubted danger that the price of benzol will tend to encourage the importation of intermediates, which, of course, is contrary to the whole spirit of the development of the British dyemaking industry.

10% Revenue Tariff

Last year I gave in full the users' arguments which were submitted by the Association to the Import Duties Advisory Committee in favour of repealing, on the ground of urgency, the 10% revenue tariff upon dyewares, but just before the annual meeting last year we were officially informed that the Import Duties Advisory Committee regretted they were unable to accede to our request. The Committee, therefore, was asked to receive a deputation in support of the association's application, but a reply was received stating that there was no possibility of the application being successful on the ground of urgency. At the same time the Committee pointed out that it would be open to the Association to make a fresh application after the expiry of the period for dealing with applications on the ground of urgency (August 29, 1932), and points were indicated on which the Committee would require evidence of hardship to colour users. A fresh application, therefore, was undertaken on the lines indicated by the Committee. There the matter remained pending further consideration of the major question of the Dyestuffs (Import Regulation) Act.

Dyestuffs (Import Regulation) Act, 1920

The third reading of the Expiring Laws Continuance Bill was to take place on December 8 last, which, of course, affected the future of the Dyestuffs Act, and in anticipation of the parliamentary discussion the Joint Committee of the Cotton Trade Organizations of Lancashire requested an interview with the President of the Board of Trade to register a protest against the renewal of the Dyestuffs Act.

The Joint Committee had already submitted the following resolution to the Board of Trade, and had also supplied a copy to all the members of Parliament for Lancashire and Yorkshire, informing them of the interview and expressing the hope that they would be present:

> "This meeting, representing organizations in every section of the cotton industry, strongly urges H.M. Government to allow the Dyestuffs (Import Regulation) Act, 1920, to lapse, at the end of the present year. If it is urged that the national interest demands special provision for the maintenance of research in this field, the textile industries see no reason why the cost should be borne by dye users alone and not spread among all taxpayers. They equally fail to see why an Act intended to promote the growth of an independent British dyestuff industry should be continued after that industry has entered into an agreement with its foreign competitors which, whatever its object may have been, has undoubtedly resulted in an increase in price to the consumer and the withdrawal of all competition."

I was asked to lead the deputation at an interview with the President and to state the case against the continuance of the Act on behalf of the Joint Committee. The meeting took place in a committee room at the House of Commons on Wednesday, December 7, 1932. Owing to the absence of Mr. Runciman, Dr. Leslie Burgin, Parliamentary Secretary to the Board of Trade, took his place and gave a most patient and courteous hearing to our representations.

Considerable interest was shown in the subject by Dr. Burgin and the members of Parliament who were present. Members of our deputation confirmed and amplified the arguments that had been put forward, and a long discussion took place on many points raised in connexion with the subject.

Dr. Burgin promised that our representations should receive consideration, and intimated that the subject would be discussed next day in the debate in the House of Commons on the Expiring Laws Continuance Bill, under which the Dyestuffs Act could be continued in force from year to year. At the debate, Mr. Herbert Holdsworth, the member for South Bradford, moved an amendment "That the Act should lapse at the end of the year." He gave a comprehensive and able summary of the reasons for this proposal, and a long debate then took place, after which Dr. Leslie Burgin stated that "in view of the diversities of opinion as to this Act the Government had decided to ask the Import Duties Advisory Committee to inquire into the whole circumstances of the dye industry, and whether interests would best be served in one way or another; to refer the whole matter to an admittedly impartial and extremely

knowledgeable committee with all kinds of expert information available to it, and in the meantime the Act would be prolonged for another year to enable the Import Duties Advisory Committee to investigate the whole question. He also stated that when this Committee reported, the Committee of Imperial Defence would estimate how the essential interests of the defence of this country would be affected by any recommendation."

The amendment that the Dyestuffs (Import Regulation) Act should lapse at the end of the year was defeated by 196 votes to 59.

The Act, therefore, was continued for a further period down to December 31, 1933.

The Government then asked the Import Duties Advisory Committee to undertake the inquiry under the following terms of reference :

"To consider the position that will arise on the expiry of the Dyestuffs (Import Regulation) Act, 1920, and in particular to advise whether the interests of trade and industry in the United Kingdom, including those of users as well as makers, will best be served by: (a) The continuance of the Act and, if so, for what period and under what conditions; or (b) The discontinuance of the Act, and, if so, whether in that event imported dyestuffs should (1) be exempted from the general *ad valorem* duty imposed under the Import Duties Act, 1932, (2) remain liable to the general *ad valorem* duty, or (3) become liable to additional duties under the Import Dnties Act, 1932, in addition to the general *ad valorem* duty, and if so, at what rates of duty."

Subsequently the Import Duties Advisory Committee, on December 29, 1932, requested your association to submit a statement giving its views on the matters comprised within these terms of reference, which, stated concisely, gave us three possible alternatives: (1) The continuance of the Act, with or without exemption from duty for licensed dyes; (2) Cessation of the Act with a duty on dyestuffs; (3) Cessation of the Act with no duties on dyestuffs.

Your Association decided, therefore, to present a complete case, coupling with their recommendation that the Act should come to an end, their protest against any tariff on dyewares. On February 4, 1933, a carefully reasoned case approved by the Council was submitted to the Committee. After this case had been submitted we were asked to appear personally before the Import Duties Advisory Committee on April 5, 1933. You will no doubt remember that our sub-committee for this purpose consisted of Messrs. C. C. Railton, C. W. Wade, F. O. Ashmore, G. E. Holden, and myself.

The Dyestuffs Advisory Licensing Committee were also asked to give a full statement of the present working and effect of the Dyestuffs (Import Regulation) Act, together with any observations which the Committee thought desirable to make on the qnestions which were raised by the Government's Terms of Reference to the Import Duties Advisory Committee.

In February, 1933, a statement was drawn up reviewing the work which the Licensing Committee carried out, showing how the various problems which arose out of the working of the Act were dealt with, and giving, at the same time, full statistics of licences granted and refused etc. This general statement was agreed upon by all the members of the Licensing Committee.

Apart from this statement, however, there were certain points on which the Committee were not in complete accord, and various members, comprising a majority of the Committee, submitted an additional report. The Chairman (Sir Thomas Robinson) submitted a comprehensive review of the situation as it appeared to him, appending thereto letters from Mr. Railton and myself, stating that our views, as colour users, differed from those of the majority of the Committee and had already been put before the Import Duties Advisory Committee by the Colour Users' Association. Subsequently, on the iuvitation of the Import Duties Advisory Committee, the Dyestuffs Advisory Licensing Committee met them on Thursday, May 18, when the members gave their views in detail and a full discussion took place.

The Joint Committee of Cotton Trade Organizations, which represents all sections of the cotton industry, both employers and employed, submitted a statement of its views on the dyestuffs question to the Import Duties Advisory Committee on April 28. This statement supported the application of textile finishing trades that the Dyestuffs Act should be discontinued and that imported dyestuffs should be exempt from duties of any kind. It emphasized the magnitude of the interests involved in the cotton industry as compared with those of the dyestuffs industry, pointing out in particular the great disparity in the amount of employment provided by the two industries, nearly 400,000 in the cotton industry, as against 7000 engaged in dye-making. The Joiut Committee also pointed out that the cotton industry had to face unrestricted competition in its export markets, and urged that it could not afford to support the dyestuffs industry in the British home market.

On July 4 the Joint Committee followed up its statement by sending a representative delegation to interview the Import Duties Advisory Committee. The delegation, which was led by Mr. Forrest Hewit, included members of all sections of the industry, and drew the attention of the Committee to the serious condition of the Lancashire cotton industry, and stressed the urgent need for removing all restrictions which involved increased costs and reduced competitive power.

The Committee gave the delegation a sympathetic hearing, and assured it that the position of Lancashire would not be overlooked.

It will be seen that the users' case has been presented to the Import Duties Advisory Committee by every representative body, and no matter what their final decision may be I am satisfied that every possible step has been taken to bring the facts to light.

I should like to take this opportunity of placing on record our appreciation of the courtesy and kindness with which we were received by the Import Duties Advisory Committee. From what I have stated it is quite evident that it has devoted an immense amount of time and thought to an intricate and difficult subject, and has been at great pains to hear the evidence, which, owing to the diversity of the interests involved, was often remarkable for variety and sometimes of a very conflicting character.

For the present there does not seem to be anything further that I can usefully say, as the future of the

Dye-tuffs Act is now *sub judice*, except that I think we have all to realize that the national economic policy has undergone a considerable change, but whatever policy is decided upon as regards the manufacturing of dye-wares in this country, it is essential, and I am sure the Government will agree with me in this, that the consumers of dyes should be safeguarded against exploitation, and I hope they will find themselves in agreement with the suggestion the users have been making repeatedly during the past year that they should have freedom from duty for imported dyestuffs.

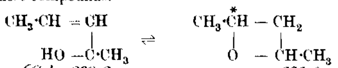
I am, however, more than ever convinced that the interests of both makers and users will be best served by a policy of helpful co-operative effort. We ought to emphasize not the minor differences which tend to separate but the major points of agreement on which we can unite. If each of us individually, with a sincere desire to see problems not only from his own angle but as they present themselves to the other man, will strive honestly for the creation of an atmosphere of mutual goodwill and tolerance, our difficulties, whether those of the makers or those of the users, will become easier of solution.

CORRESPONDENCE

TAUTOMERIC FORMS OF SUBSTITUTED ALLYL ALCOHOLS

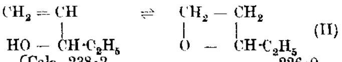
SIR,—(+)αγ-Dimethylallyl hydrogen phthalate, obtained by the resolution of the *dl*-ester with brucine,[1] is a well-defined crystalline compound. An investigation now in progress has shown that it yields the *dl*-alcohol when hydrolyzed by dilute sulphuric acid, but the (+) alcohol when hydrolyzed by dilute alkalis. This (+) alcohol has a pronounced temperature-rotation coefficient, is lævo-rotatory in ether, exhibits anomalous rotatory dispersion, and sometimes shows mutarotation. The properties of (+)αγ-dimethylallyl alcohol thus differ markedly from those of the optically active α-substituted allyl alcohols[2] which exhibit simple rotatory dispersion and in other ways appear to be normal.

A search for the cause of the unexpected properties of αγ-dimethylallyl alcohol has led to the discovery that the parachors of this and the α-substituted allyl-alcohols are not in agreement with the usually accepted formulæ of these compounds.



(I)

[P]			
Calc.	238·2		226·0
Obs.		14°	228·9
		61°	228·9



(II)

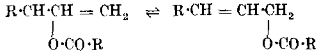
[P]			
Calc.	238·2		226·0
Obs.		14°	228·1
		26°	228·0

* Additional centre of symmetry.

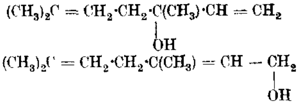
The experimental values of the [P] of αγ-dimethylallyl alcohol (I) and α-ethylallyl alcohol (II) suggest that at temperatures up to 60°, these alcohols exist mainly in cyclic forms. On this hypothesis, the anomalous rotatory dispersion and mutarotation exhibited by (+)αγ-dimethylallyl alcohol may be due to the presence of the additional centre of asymmetry generated by ring formation.

Allyl alcohol itself has an open chain structure, [P] found 159·3, calc. 160·1, but cinnamyl alcohol probably assumes a cyclic form, [P] found 324·4, calc. (for open chain) 331·2. It thus appears that substitution at either the α- or γ-carbon atom is essential for tautomerism to arise. Replacement of the hydroxyl hydrogen atom also leads to a definite open chain structure: (−)αγ-dimethylallyl *n*-butyl ether obtained by the action of *n*-butyl bromide on the potassio-derivative of the (+) alcohol has [P] 393·8 (calc. for the open chain form 394·2).

That the α- and γ-carbon atoms in compounds containing a vinyl or substituted vinyl group may become linked through an oxygen atom is also suggested by the tautomerism of carboxylic esters of substituted allyl alcohols, first described by Gillet[3] and since studied by Prévost,[4] Meisenheimer,[5] and Ingold and Burton.[6]



An interesting example of this type of change is the conversion, effected by acids, of linalol into geraniol.



a change similar in many respects to that occurring when (+)αγ-dimethylallyl alcohol racemises in dilute sulphuric acid.

The acid phthalate grouping of (+)αγ-dimethylallyl hydrogen phthalate is also mobile and can be replaced by, *e.g.*, *n*-butyloxyl, when (−)αγ-dimethylallyl *n*-butyl ether is obtained, *i.e.*, opposite in sign of rotation to the ether prepared directly from the (+) alcohol and *n*-butyl bromide. This indicates that a Walden inversion occurs when the acid phthalate grouping is replaced, and is thus the first recorded instance of this change during the reactions of a carboxylic ester of an optically active alcohol.

The evidence in favour of the existence of ring-chain tautomerism among substituted allyl alcohols is thus substantial and raises the question whether substituted acrylic acids exhibit tautomerism of a similar type. This recalls that these acids differ so markedly from the βγ-unsaturated acids that a special hypothesis[7] is necessary to explain their abnormal properties. Another significant observation is that substituted acrylic acids absorb halogens in a curious manner. They are readily saturated by bromine vapour,[8] but take up iodine very slowly from either Hubl's, Wijs', or Hanus' solutions.[9] Crotonic acid,[8] for example (theoretical I.V. 295·4) gives I.V. 86·7 after 18 hours' contact with Wijs' solution, whereas the I.V. calculated from the bromine vapour absorbed in 1 hour is 296·2. The [P] of crotonic acid (found 201·2, calc. for acid 205·0)

. . ., but this cannot be taken as evidence of the exis- . . of a β-lactone in the acid under observation. . . it was probably associated, and for this reason its . would show a negative anomaly.[10]

We are, Sir, etc.,
H. W. J. HILLS
J. KENYON
H. PHILLIPS

Battersea Polytechnic,
S.W.11
Aug. 3, 1933

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[9] Ponzio and Gastaldi, Gazz. Chim. Ital., 1912, **42**, 92.
[10] Sugden, The Parachor and Valency, p. 167.

THE DISCOVERY OF NITROGEN PEROXIDE

SIR,—In his lecture on Priestley (J. Chem. Soc., July, p. 906), Prof. Meldrum deplores that "the text-books" give him no credit for the discovery of nitrogen peroxide. "The text-books" referred to are, no doubt, those familiar to the lecturer, but there are exceptions. In my own three, Priestley is given credit for the discovery (*e.g.*, "School Course of Chemistry," p. 231: the red gas was discovered by Priestley; he called it *nitrous vapour*"; the account is based on Priestley's own descriptions), and, if my memory is correct, the same credit is paid in Prof. Lowry's admirable "Historical Introduction to Chemistry." Prof. Meldrum, as a writer on the history of chemistry, knows how misleading and liable to error these generalized statements are apt to be, but even "the text-books" are as deserving of careful justice with an accurate writer as a famous chemist. The supposed injustice is purely imaginary.

J. R. PARTINGTON

London, E.1
Aug. 8, 1933

PERSONAL AND OTHER ITEMS

We regret to announce the death on August 2 of Prof. H. G. Greenish, who until his retirement recently was Professor of Pharmaceutics in the University of London. Prof. Greenish was secretary of the Pharmaceutical Society's Committee responsible for the British Pharmacopœia of 1898, and was joint editor with Sir Nestor Tirard of the 1914 edition; he was also a member of the commission responsible for last year's issue. In the early part of his career he became a demonstrator in the School of Pharmacy controlled by the Pharmaceutical Society of Great Britain, and as Professor of Pharmaceutics and later as Dean of the School he continued the association for nearly half a century. He was a Fellow of the Institute of Chemistry.

Dr. Stanley H. Badock, pro-chancellor of Bristol University, is to be president of the Congress of the Royal Sanitary Institute at Bristol in July, 1934.

Mr. W. A. Robertson, formerly of the Indian Forest Service, has been appointed to succeed Sir Ralph S. Pearson on his retirement from the position of Director of Forest Products Research (D.S.I.R.), on September 30 next.

The following have recently been appointed to fill vacancies occurring on the National Research Council of Canada: Dr. G. S. Barton, of the Department of Agriculture, Montreal; Dr. C. Camsell, of the Department of Mines, Ottawa; Dr. A. L. Clark, Dean of the Faculty of Applied Science, Queen's University, Kingston; Dr. A. Frigon, of the Université de Montréal; and Dr. J. C. Smith, of the Shawinigan Water & Power Co., Ltd., Montreal.

Mr. T. D. Morgan, M.I.Mech.E. has been appointed agent in South Wales and the West of England for Wild-Barfield Electric Furnaces, Ltd. and G.W.B. Electric Furnaces. His address is Glaisdale, Porthcawl, Glamorgan, and his telephone number, Porthcawl 30.

Sir Walter Morley Fletcher, F.R.S., secretary of the Medical Research Council, who died on June 7, left estate of the gross value £4563, with net personalty £2819.

Nomenclature of the Œstrin Group

In a communication to *Nature* (August 5), it is suggested that the recent work of Butenandt, Marrian, and others on the œstrus-producing hormone summarized in the Chemical Society's discussion on March 16 (cf. CHEM. & IND., March 24 and 31) has consolidated the knowledge of the chemistry of these substances and shown that they are closely related to the sterols. It is pointed out that it appears opportune to adopt a uniform chemical nomenclature for the derivatives of œstrin which harmonizes with that used for the sterols.

The name œstrane is put forward for the parent saturated hydrocarbon of the œstrin group, $C_{18}H_{30}$, containing the sterol skeleton with one methyl group but without the side chain. The common names of œstriol and œstrone are proposed for the trihydroxy derivative and the ketohydroxy derivative respectively in place of the full chemical names, which are cumbrous for general and biological use. A table is given showing the nomenclature of eight of the principal compounds of the group, with their formulæ and the names previously in use, together with the new chemical and abbreviated names which are proposed. The signatories to the letter are N. K. Adam, J. F. Danielli, E. C. Dodds, H. King, G. F. Marrian, A. S. Parkes, and O. Rosenheim.

Empire Marketing Board

It has been announced that the Government has decided to discontinue the Empire Marketing Board at the end of September, and the market intelligence services which have been carried on by the Board will be continued by the Imperial Economic Committee. Scientific work will be taken over by other institutions.

The Board was set up in 1926, and the whole cost of its operations, nearly £3,500,000, has been borne by the United Kingdom. Efforts have been made since the Ottawa Conference to continue the Board with the help of grants from the Dominions, but the Dominions have declined to make such grants.

Gas Engineering Scholarships

Two scholarships have recently been endowed to enable students to take three or four years' courses of study at the University of Leeds in preparation for responsible gas engineering positions, and have just been awarded by the Senate of the University. The Cartwright Holmes Scholarship has been awarded to Mr. R. G. Parker, who is at present junior technical assistant with the Plymouth and Stonehouse Gas Light and Coke Co. The Corbet Woodall Scholarship has been awarded to J. Castle, at present junior technical assistant in the Brighouse Corporation Gas Department.

Industrial Designs.

A selection of the designs submitted for the 10th Annual Open Competition of Industrial Designs for prizes and scholarships offered by the Royal Society of Arts and other bodies is at present being exhibited in the Exhibition Pavilion at the Imperial Institute, South Kensington, London, S.W. The exhibition will continue until August 31. It includes designs in architectural decoration, textiles, furniture, etc., and many examples of advertising and commercial art. It has not yet been decided whether a similar competition is to be held in 1934, but firms or trade associations desiring to offer prizes for designs, or to contribute to the general prize fund, are invited to communicate with the secretary, Royal Society of Arts, John Street, Adelphi, London, W.C.2.

Oil from Welsh Coal

Following the Government announcement of guaranteed preference for oil produced from coal, the possibility of building a plant for the purpose has been considered at a conference of the South Wales Industrial Development Council held recently in Cardiff. A committee has been formed which includes, in addition to a number of coalowners, Mr. E. L. Hughes, South Wales manager of the National Benzole Co., Ltd., Dr. Roy Illingworth, and Prof. George Knox.

New Pyrites Deposits in Russia

It is reported (Die Chemische Industrie) that rich pyrites deposits, estimated at 1·5 million tons, have been discovered near Kutaisk. The sulphur content is as high as 40%. Other deposits estimated at 150 million t. are reported in the Volga basin, the average copper content being about 4%. In the same region gold-containing ores, estimated at 12 million t. have been located. There is also a report of the discovery of a deposit of sulphur.

Indian Chemical Imports

During the fiscal year April 1, 1932, to March 31, 1933, the imports of chemicals into India increased in value by Rs. 14,25,000, or about 6%, mainly on account of increased imports of sodium carbonate, potassium chlorate, and sulphur. The imports of drugs and medicines were slightly lower than in the previous year owing principally to a falling off of about 18% in the imports of proprietary materials.

American Plastics Industry

Figures quoted in *Die Chemische Industrie* show that the American Plastics industry reached a peak in 1929, and by 1932 had declined by about 45%, on the basis of the value of the production. In 1931, between 17,000 and 20,000 short tons of synthetic resins from phenol and similar substances were produced, phenol-formaldehyde and phthalic acid–glycerol plastics being the most important American products. The manufacture of thiourea-formaldehyde resins was started in 1932. The value of the synthetic resin export in 1932 was $120,000, compared with $191,000 and $173,000 in 1931 and 1930.

International Agricultural Congress

The Third International Technical and Chemical Congress of Agricultural Industries is to be held at the invitation of the French Government in Paris next year, from March 28 to April 5. A preliminary programme has been drawn up by the French Ministry of Agriculture in consultation with the representatives of 14 other countries, and the work of the conference will be divided into five main sections, one of which will be concerned with foods, and matters for discussion by this section include the quality of bread, the transport and treatment of milk, and the evolution of new methods in the manufacture of chocolate. Other sections will deal with the fermentation industries, sugar, and scientific studies concerned with p_H determination, improvement of crops, etc. Full information can be obtained from the secretariat of the Congress, 156, Boulevard de Magenta, Paris (10e).

Dechema

The Deutsche Gesellschaft für Chemisches Apparatewesen E.V. ("Dechema") has published (in German) an attractive brochure dealing with "Achema VII," the Exhibition of Chemical Engineering, which is to be held in Cologne from May 18 to 27 next year under the presidency of Dr. Buchmann of Cologne. A special series of exhibits will be concerned with welding in the construction of chemical plant. Particulars of the exhibition can be obtained from the Dechema, Seelze bei Hannover.

World Production of Magnesium

The present world production of magnesium is given as 2500 tons (Die Chemische Industrie), about 75% coming from Germany. France at present contributes about 5% to the total, but two companies (Péchiney and Ugine) will shortly commence production by the electrolysis of magnesium chloride. The Péchiney plant is to have a yearly capacity of 1000 t.

Canadian Chemical Production

The production of sulphuric acid in Canada showed an increase during 1932, 136,846 tons being manufactured as compared with 119,541 in the previous year. Of this total, about 80,000 t. were intended for use in the producers' own plants or associated works.

Production of sulphate of ammonia showed a remarkable increase during the year, the total of 57,770 t. being more than twice as much as the previous year's figure, and the value of $983,077 was 39% greater than the previous year's valuation.

During the year there were 10 coal distillation plants in operation in Canada, production being valued at $2,114,650. The main products were creosotes, refined tar, road tar and pitch, whilst phenol, cresol, xylenols, and other coal-tar derivatives assumed importance.

MARKET REPORT

This Market Report is compiled from special information received from the manufacturers concerned.

Unless otherwise stated, the prices quoted below cover fair quantities net and naked at sellers' works.

GENERAL HEAVY CHEMICALS

Acid Acetic, 40% tech.—£20 5s. per ton d/d address U.K. in casks.

Acid Chromic.—11d. per lb., less 2½% d/d U.K.

Acid Hydrochloric.—Spot, 4s.—6s. per carboy d/d according to purity, strength, and locality.

Acid Nitric 80° Tw.—Spot, £18—£25 per ton makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia (Anhydrous).—Spot, 10d. per lb. d/d in cylinders.

Ammonium Bichromate.—8d. per lb., d/d U.K.

Bisulphite of Lime.—£6 10s. per ton. f.o.r. London, packages free.

Bleaching Powder, 35/37%.—Spot, £8 15s. per ton d/d station in casks, special terms for contracts.

Borax, Commercial.—Granulated, £15 10s. per ton; Powder, £17 per ton. (For 1-ton lots and upwards, packed in 1-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride, Solid, 70/75%.—Spot, £5 5s. per ton d/d station in drums.

Chrometan.—Crystals, 3½d. per lb.; Liquor, £19 10s. per ton d/d U.K.

Chromium Oxide.—10d.—10½d. per lb., according to quantity, d/d U.K.

Methylated Spirits, 61 O.P.—Industrial, 1s. 8d.—2s. 3d. per gal.; Pyridinized Industrial, 1s. 10d.—2s. 6d. per gal.; Mineralized, 2s. 9d.—3s. 3d. per gal. 64 O.P. 1d. extra in all cases. Prices according to quantity.

Nickel Sulphate.—£49 per ton d/d.

Nickel Ammon. Sulphate.—£49 per ton d/d.

Potash, Caustic.—£30—£33 per ton. Potass. Bichromate crystals and granular.—5d. per lb., net d/d U.K., for spot. Discount according to quantity. Ground, 5¾d. per lb.

Potassium Chromate.—6½d. per lb., d/d U.K.

Sal ammoniac, Firsts lump.—Spot, £42 17s. 6d. per ton d/d address in barrels. Chloride of Ammonia.—£37—£45 per ton, carr. paid.

Salt Cake, unground.—Spot, £3 15s. per ton d/d station in bulk.

Soda Ash, 58° E.—Spot, £5 17s. 6d. per ton, f.o.r. in bags, special terms for contracts.

Soda, Caustic, solid 76/77° E.—Spot, £14 5s. per ton d/d station in drums, special terms for contracts.

Soda crystals.—Spot, £5—£5 5s. per ton d/d station or ex depôt in 2-cwt. bags.

Sod. Acetate 97/98%.—£21 per ton. Sod. Bicarbonate (refined).—Spot, £10 10s. per ton d/d station in bags. Sod. Bichromate Crystals, Cake, and Powder.—4d. per lb., net d/d U.K., discount according to quantity. Anhydrous 5d. per lb. Sod. Bisulphite Powder 60/62%.—£16 10s. per ton delivered, 1-cwt. iron drums for home trade.

Sodium Chromate.—3¾d. per lb., d/d U.K.

Sod. Phosphate.—£12 10s. per ton, f.o.r. London, casks free. Sod Silicate 140° Tw.—Spot, £8 5s. per ton d/d station, returnable drums. Sod. Sulphate (Glauber's Salt).—Spot, £4 2s. 6d. per ton d/d. Sod. Sulphide solid, 60/62%.—Spot, £10 15s. per ton, d/d in drums. Crystals, 30/32%.—Spot, £8 per ton, d/d in casks. Sod. Sulphite, Pea Cryst.—Spot, £13 10s. per ton, d/d station in kegs; Commercial.—Spot, £9 10s. per ton, d/d station in bags.

RUBBER CHEMICALS

Antimony Sulphide.—Golden.—6½d.—1s. 1½d. per lb., according to quality. Crimson.—1s 3d.—1s. 5d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 5d.—1s. 7d. per lb

Barytes.—£7 10s.—£9 per ton, according to quality.

Cadmium Sulphide.—2s. 9d.—3s. 1d. per lb.

Carbon Bisulphide.—£30—£32 per ton, according to quantity, drums extra.

Carbon Black.—3¼d.—4¾d. per lb., ex wharf.

Carbon Tetrachloride.—£41—£46 per ton, according to quantity, drums extra.

Chromium Oxide, Green.—1s. 2d. per lb.

Diphenylguanidine.—2s. 2d. per lb.

India-rubber Substitutes, White.—4½d.—4¾d. per lb. Dark.—3½d.—4½d. per lb.

Lamp Black.—£45—£48 per ton.

Lead Hyposulphite.—9d. per lb.

Lithopone, 30%.—£17 10s.—£18 per ton.

Mineral Rubber "Rupron."—£18 10s. per ton.

Piperidine Rubber Accelerators.—P.P.D.—10s. 6d.—11s. 6d. per lb.; Z.P.D.—7s.—7s. 6d. per lb.; L.P.D.—6s. 6d.—7s. per lb.; P.T.D.—9s. 8d.—10s. 4d. per lb.; C.P.D.—8s. 3d.—8s. 10d. per lb.; S.P.D.—8s. 1d.—8s. 7d. per lb.; P.T.M.—11s. 6d.—12s. 6d. per lb.

Sulphur.—£11 10s. per ton. Sulphur Precip. B.P.—£55—£60 per ton. Sulphur Precip. Comm.—£50—£55 per ton.

Sulphur Chloride.—5d.—7d. per lb., according to quantity.

Vermilion, pale or deep.—4s. 3d.—4s. 5d. per lb.

Zinc Sulphide.—11d.—1s. per lb., according to quality

WOOD DISTILLATION PRODUCTS

Acetate of Lime.—Brown, £8 10s.—£8 15s. per ton. Grey, £13—£14 per ton. Liquor, Brown, 30° Tw., 6d. per gal.

Amyl Acetate, technical.—95s.—110s. per cwt.

Charcoal.—£6—£11 per ton, according to grade and locality.

Methyl Acetone, 40/50%.—£50—£52 per ton.

Wood Naphtha.—Miscible.—2s. 7d.—4s. per gal. Solvent, 3s. 9d.—4s. 9d. per gal.

Wood Tar.—£2—£6 per ton.

Wood Creosote.—6d.—2s. per gal.

TAR PRODUCTS

Acid Carbolic.—Crystals.—9d.—10d. per lb. Crude 60's, 2s. 5d.—2s. 6d. per gal. 2% water—3s. 0¾d. per gal.

Acid Cresylic, 99/100.—11d.—1s. 8d. per gal., according to specification. Refined, 1s. 8d.—1s. 9d. per gal. Pale, 98%, 1s. 4d.—1s. 5d. per gal. 95%, 11d.—11½d. per gal. Dark, 10d. per gal.

Anthracene Oil, Strained, 4½d. per gal.

Benzole.—Prices at works: Crude, 9d.—9½d. per gal.; Standard motor, 1s. 4d.—1s. 4½d. per gal.; 90%, 1s. 5d.—1s. 6d. per gal.; Pure, 1s. 7½d.—1s. 8d. per gal.

Creosote.—B.S.I. specification, 3d. per gal., d/d. *Heavy*—4d. per gal.
Naphtha.—Solvent, 90/160, 1s. 4d.—1s. 5d. per gal. *Solvent* 95/160, 1s. 7d. per gal. *Solvent* 90/190, 9d.—1s. 1d. per gal.
Naphthalene.—*Purified crystals*, £9 10s. per ton in bags. Crude, Hot Pressed, £6 5s. per ton. Flaked,
Pitch, medium, soft.—80s. per ton, in bulk at makers' works.
Pyridine.—90/140 -4s.—4s. 6d. per gal.; 90/180—2s.—2s. 3d. per gal.
Toluole.—90%, 2s. 2d.—2s. 3d. per gal. Pure, 2s. 6d. per gal.
Xylol.—2s.—2s. 1d. per gal. Pure, 2s. 3d.—2s. 4d.

PHARMACEUTICAL AND PHOTOGRAPHIC MATERIALS

Acid. Acetic, Pure 80% —£39 5s. per ton d/d address U.K. in casks.
Acid, Acetyl Salicylic.—2s. 9d.—2s. 11d. per lb., according to quantity.
Acid, Benzoic, B.P.—1s. 9d.—1s. 11d. per lb. Solely ex Gum.—1s. 3d.—1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
Acid, Boric, B.P.—Cryst., £35 10s. per ton. Powder, *£36 10s. per ton. Ex-Fine Powder, £38 10s. per* ton. For 1-ton lots and upwards, packed in 1-cwt. bags, carriage paid any station in Great Britain.
Acid, Camphoric.—19s.—21s. per lb.
Acid, Citric.—9½d. per lb. Less 5%.
Acid, Gallic.—2s. 9d. per lb. for pure crystal in 1-cwt. lots.
Acid, Molybdic.—5s. 3d.—5s. 9d. per lb., according to quantity.
Acid, Pyrogallic, Cryst.—6s. 9d. per lb. for 1-cwt. lots. Resublimed.—8s. 6d. per lb. for 28-lb. lots d/d.
Acid, Salicylic.—B.P. pulv., 1s. 7d.—1s. 10d. per lb. Technical, 1s. 2d.—1s. 4d. per lb.
Acid, Tannic, B.P.—3s. 9d. per lb.
Acid, Tartaric.—11¾d. per lb. Less 5%.
Acetanilide.—1s. 5d. per lb.
Ammon. Benzoate.—3s. 3d.—3s. 9d. per lb.
Ammonium Hippurate.—19s. 6d.—23s. 6d. per lb.
Ammonium Iodide.—17s.—17s. 6d. per lb.
Ammonium Molybdate.—5s.—5s. 6d. per lb., according to quantity.
Argent. Nitras, Crystal.—1s. 1d. per oz.
Arsenic Iodide.—22s. 6d.—25s. per lb.
Benzonaphthol.—3s. 3d.—3s. 9d. per lb.
Berberine, Hydrochloride.—5s. 6d.—6s. per oz.; Sulphate, 5s. 6d.—6s. per oz.
Bismuth Salts.—Carbonate, 6s. 10d. per lb.; Citrate, 9s. 3d. per lb.; Nitrate (cryst.), 4s. 7d. per lb.; Oxide, 10s. 6d. per lb.; *Salicylate, 7s. 7d. per lb.*; Subchloride, 10s. 3d. per lb.; Subgallate, 7s. 3d. per lb.; Subnitrate, 5s. 11d. per lb. Above for cwt. lots. Extra and reduced prices for smaller and larger quantities respectively. Liquor Bismuthi, P.B., in W. Qts.—1s. 1½d. per lb.; 6 W. Qts.—11d. per lb.; 12 W. Qts.—9½d. per lb.; 36 W. Qts.—9d. per lb.
Borax, B.P.—Crystal, £24 10s. per ton. Powder, £25 per ton. For 1-ton lots and upwards, packed in 1-cwt. bags, carr. paid any station in Great Britain.
Bromides, B.P.—Ammonium.—1s. 10d. per lb. Potassium.—1s. 7d. per lb. Sodium.—1s. 9d. per lb. Prices for 1-cwt. lots.
Cadmium Iodide.—14s. 6d. per lb.
Calcium Hippurate.—26s.—30s. per lb.
Calcium Iodide.—20s. per lb.
Calcium Lactate, B.P.—1s. 2d.—1s. 4d. per lb., accor ing to quantity.
Camphor.—Refined flowers, 3s. 1d.—3s. 2d. per l *Transparent tablets*, 3s. 4d.—3s. 6d. per lb., accor ing to quantity; also special contract prices.
Chloroform.—2s. 3d.—2s. 8d. per lb.
Cinchophen.—11s. 6d.—12s. 6d. per lb.
Cocaine, Alkaloid and Citrate.—For export.—29s. 10 —31s. 7d. per oz. Hydrochloride and Nitrat 27s. 1d.—28s. 11d. per oz.
Ephedrine hydrochloride.—5s. 6d.—6s. per oz.
Ergosterol.—2s. 6d. per gm.
Ethers.—S.G. 730, 1s. 1d.—1s. 2d. per lb., according quantity, and other prices according to speci gravity.
Hexamine.—2s. 4d.—2s. 6d. per lb., according quantity.
Hippuric Acid.—17s. 6d.—21s. 6d. per lb.
Hydrogen Peroxide (12 vols.).—1s. 4d. per gal., f.c makers' works, naked. B.P.—10 vols., 2s.—2s. per gal.; 20 vols., 3s. per gal.
Hypophosphites.—Calcium, 2s. 9d.—3s. 2d. per Potassium.—3s. 4d.—3s. 9d. per lb. Sodiu 2s. 11d.—3s. 4d. per lb.
Iodine Resub., B.P.—14s. 8d.—18s. 9d. per lb.
Iodoform, B.P., Cryst., Precip. or Powder.—17s. 7d 21s. 7d. per lb.
Iron Ammon. Citrate.—B.P.—1s. 9d. per lb. for 28- *lots. Green, 2s. 5d. per lb. (list price).*
Iron Iodide.—17s. 6d.—18s. per lb.
Iron Perchloride.—18s.—20s. per cwt., according quantity.
Iron Quinine Citrate. B.P.—9¾d.—1s. 0½d. per according to quantity.
Lead Iodide.—14s.—15s. per lb.
Lithium Carbonate, B.P., 1914.—5s. 4d. per lb.
Lithium Chloride, Cryst.—8s. 3d. per lb.
Lithium Citrate.—5s. 3d. per lb. Powder.—5s. per lb.
Lithium Hippurate.—18s. 6d.—22s. 6d. per lb.
Lithium Iodide.—20s. 6d.—21s. 6d. per lb.
Magnesium Carbonate.—Light, 28s. per cwt.
Magnesium Oxide.—Light, 70s. per cwt.; Hea 1s. 8d. per lb.; in quantity lower.
Menthol.—A.B.R., recryst., B.P., 15s. per lb. n Synthetic, 8s. 6d.—12s. per lb. Synthetic detacl crystals, 8s. 6d.—10s. 6d. per lb., according to qu tity; *Liquid* (95%), 8s. 6d. per lb.
Mercurials, B.P.—Red oxide crystals, 5s. 10d.—5s. 1 per lb.; Levig, 5s. 4d.—5s. 5d. per lb.; Corros sublimate, Lump, 4s.—4s. 1d. per lb.; Powd 3s. 8d.—3s. 9d. per lb.; White precip., Lur 4s. 9d.—4s. 10d. per lb.; Powder, 4s. 11d.—5s. lb.; Calomel, 4s. 9d.—4s. 10d. per lb. Yell Oxide, 5s. 2d.—5s. 3d. per lb.; Persulph., B.P. 4s. 11d.—5s. per lb.; Sulph. nig., 4s. 10d.—4s. 1 per lb. Special prices for larger quantities.
Mercury, Benzoate.—8s. 3d. per lb.; Cyanide, 12s. 7d 13s. 1d. per lb.; Oleate (5%), 1s. 11d.—2s. 2d. lb.; (10%), 2s. 9d.—3s. per lb.; (20%), 3s. 9d 4s. per lb. Protonitras, 6s. 9d. per lb.; Pro sulphate, 7s. 3d. per lb.; Subsulphate flav., 7s. per lb.
Methyl Salicylate.—1s. 4½d.—1s. 6½d. per lb.
Paraformaldehyde.—1s. 3d.—1s. 5d. per lb.
Paraldehyde.—1s. 4d.—1s. 10d. per lb.
Phenacetin.—4s.—4s. 6d. per lb.
Phenolphthalein.—4s. 5d.—5s. 8d. per lb.

Potass. Bitartrate.—99/100% (Cream of Tartar), 80s. per cwt., less 2½%.
Potass. Citrate.—B.P., 1s. 7d. per lb. for 28-lb. lots.
Potass. Ferricyanide.—1s. 7½d. per lb., in 125-lb. kegs.
Potass. Iodide, B.P.—13s.—15s. 6d. per lb., according to quantity.
Potass. Permanganate.—8½d. per lb. for 1-ton lots.
Potass. Metabisulphite.—50s. per cwt. d/d London, kegs free.
Potassium Hippurate.—26s.—30s. per lb.
Quinine Sulphate.—1s. 10d. per oz., for 100-oz. tins, tins free.
Saccharin.—37s. 6d. per lb., and lower in quantity.
Salicin.—15s.—16s. per lb., according to quantity.
Santonin, B.P.—28s. per oz.
Seidlitz powder (pulv.).—55s.—58s. 9d. per cwt.
Silver Nitrate.—1s. 3½d. per oz. for quantity. Sticks, 2d. per oz. extra.
Sod. Barbitonum.—13s. 9d.—15s. per lb.
Sod. Benzoate, B.P.—1s. 7d. per lb., according to quantity.
Sod. Citrate, B.P.C., 1911.—1s. 4d. per lb. B.P.C., 1932, and U.S.P.—1s. 8d. per lb. for 28-lb. lots.
Sodium Hippurate.—23s. 6d.—27s. 6d. per lb.
Sod. Hyposulphite.—Photographic, £15 per ton d/d consignee's station, in 1-cwt. kegs.
Sodium Iodide, B.P.—14s.—17s. 1d. per lb.
Sod. Nitroprusside.—16s. per lb.
Sod. Potass. Tartrate (Rochelle Salt).—65s. per cwt. net for 1-ton lots. Crystals, 2s. 6d. per cwt. extra.
Sod. Salicylate.—Powder, 2s.—2s. 8d. per lb. Crystal, 2s. 1d.—2s. 9d. per lb.
Sod. Sulphide.—Pure recryst., 10d.—1s. 2d. per lb.
Sod. Sulphide anhydrous.—£23—£25 per ton, according to quantity, d/d U.K.
Strontium Iodide.—17s. 6d. per lb.
Tartar Emetic B.P.—3s. 9d.—4s. 6d. per lb.
Terpine hydrate.—1s. 2d.—1s. 5d. per lb.
Thymol, Puriss.—5s. 9d.—6s. 6d. per lb., according to quantity. Natural.—12s. per lb.
Zinc Iodide.—21s.—22s. per lb.
Zinc Stearate.—1s. 4d.—1s. 6d. per lb.

PERFUMERY CHEMICALS

Acetophenone.—7s. per lb.
Aubepine (*ex Anethole*).—8s. per lb.
Amyl Acetate.—2s. 3d. per lb. Amyl Butyrate.—4s. per lb. Amyl Cinnamic Aldehyde.—8s. 3d. per lb. Amyl Salicylate.—2s. 9d. per lb. Anethol, 21/22° C., 4s. 9d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. per lb. Benzyl Alcohol free from Chlorine.—2s. per lb. Benzyl Benzoate, 2s. 3d. per lb.
Cinnamic Aldehyde.—Natural, 12s. 3d. per lb.
Citronellol.—8s. 6d. per lb.
Citral.—7s. per lb.
Coumarin.—15s. per lb.
Ethyl Cinnamate.—8s. 6d. per lb.
Ethyl Phthalate.—2s. 6d. per lb.
Eugenol.—7s. 3d. per lb. Geraniol (Palmarosa).—17s. per lb. Geraniol.—6s. 6d.—11s. per lb. Heliotropine.—6s. per lb. Iso Eugenol.—8s. 6d. per lb. Linalol.—(*ex Bois de Rose*) 6s. 3d. per lb.—(*ex Shui Oil*) 5s. 6d. per lb. Linalyl Acetate.—(*ex Bois de Rose*) 7s. 6d. per lb.—(*ex Shui Oil*) 6s. 6d. per lb.
Methyl Anthranilate.—9s. per lb.
Methyl Benzoate.—4s. 6d. per lb.
Musk Ketone.—38s. per lb.
Musk Xylol.—8s. per lb.
Nerolin.—5s. per lb.
Phenyl Ethyl Acetate.—10s. per lb.
Phenyl Ethyl Alcohol.—8s. 6d. per lb.
Rhodinol.—60s. per lb. Safrol.—1s. 6d. per lb. Terpineol.—2s. per lb. Vanillin (*ex Clove Oil*).—16s.—18s. per lb.—(*ex Guaiacol*)—14s. 3d.—16s. 3d. per lb.

ESSENTIAL OILS

Almond.—Foreign S.P.A., 9s. per lb. Anise.—2s. 1d. per lb. Araucaria, 8s. 6d. per lb.—Bergamot.—6s. 6d. per lb. Bourbon Geranium.—24s. 9d. per lb.
Camphor.—Brown, 70s. per cwt.—White, 75s. per cwt. Cananga, Java, 10s. per lb. Cinnamon Oil.—3s. 6d. per lb. Cassia, 80/85%, 4s. 6d. per lb.
Citronella Oil.—Java, 2s. 9d. per lb. Ceylon, 2s. 3d. per lb. Clove.—90/92% English, 4s. 9d. per lb.
Eucalyptus, Australian B.P., 70/75%.—1s. 2d. per lb. Huon Pine (*Methyleugenol, 95%*), 16s. per gal. Lavender.—Mont Blanc, 38/40%.—10s. 9d. per lb. Lemon.—4s. 6d. per lb. Lemongrass.—4s. 3d. per lb. Orange, Sweet.—6s. 6d. per lb. Otto of Rose.—Anatolian, 37s. 6d. per oz.; Bulgarian, 55s. per oz. Palma Rosa, 8s. per lb.
Peppermint.—Japanese, 6s. 6d. per lb. Wayne County, 14s. 3d. per lb. Petitgrain.—4s. 9d. per lb.
Sandalwood, Mysore —30s. per lb. 90/92%, 20s. per lb. Australian, B.P. and French Codex, 92/95%, 15s. 6d. per lb.

INTERMEDIATES

Items marked thus * d/d buyers' works.

*Acid, Benzoic, 1914 B.P. *ex Toluol*.—1s. 9½d. per lb. in casks.
*Acid Gamma.—Spot, 4s. per lb., 100%.
*Acid H.—Spot, 2s. 4½d. per lb., 100%.
*Acid Neville and Winther.—Spot, 3s. per lb., 100%.
*Acid Sulphanilic, 8d. per lb.
*Aniline Oil, spot, 8d. per lb., drums extra.
*Aniline Salts, spot, 8d. per lb., casks free.
*Benzaldehyde, spot, 1s. 8d. per lb., packages extra.
*Benzidine Base.—Spot, 2s. 5d. per lb., 100%.
o-Cresol 30/31° C.—£2 6s. 5d. per cwt. in 1-ton lots.
m-Cresol 98/100%.—2s. 3d. per lb., in ton lots.
p-Cresol 34.5° C.—1s. 9d. per lb., in ton lots.
Dichloraniline.—2s. 3d. per lb.
*Dimethylaniline.—Spot, 1s. 6d. per lb., packages extra.
Dinitrobenzene.—8d. per lb.
Dinitrotoluene 48/50° C.—8d. per lb. 66/68° C.—9d. per lb.
*Diphenylamine.—Spot, 2s. per lb.
*α-Naphthol.—Spot, 2s. 4d. per lb.
*β-Naphthol.—Spot, £78 15s. per ton, in paper bags; £79 15s. per ton in casks, in 1-ton lots.
*α-Naphthylamine.—Spot, 11½d. per lb.
*β-Naphthylamine.—Spot, 2s. 9d. per lb.
o-Nitraniline.—5s. 10d. per lb.
**m*-Nitraniline.—2s. 7d. per lb.
**p*-Nitraniline.—Spot, 1s. 8d.—2s. 1d. per lb.
*Nitrobenzene.—Spot, 4½d. per lb., 5-cwt. lots, drums extra.
Nitronaphthalene.—9d. per lb.
*Sodium Naphthionate.—Spot, 1s. 9d. per lb., 100%.
**p*-Toluidine.—Spot, 1s. 11d. per lb.
**o*-Toluidine.—Spot, 9½d. per lb., drums extra.
m-Xylidine acetate, 3s. 4d. per lb., 100%.

PATENT LIST

The following is a list of complete specifications of chemical interest which are open for inspection under Section 91 (4) (a) of the Patent Acts. Printed copies are not available, but photographic copies may be obtained at a charge of 1s. per page (minimum 1s.) from the Patent Office, Chancery Lane, W.C.2.

I. 34,221 (1932). Taylor. Freezing water and other congealable liquid.

36,244 (1932). Internat. Pulverizing Corp. Pulverizing of minerals etc.

1729—31 (1933). Soc. Franc-Comtoise des Bois Secs. Drying materials.

1812 (1933). Austerweil and Jeanprost. *See* XXIII.

2124—6 (1933). Aktieb. Separator. Preventing superheating in apparatus for continuous treatment of liquids.

II. 19,265 (1932). Nimz. Briquetting coal.

2142—3 (1933). Soc. Anon. Carburateur Defi. Fuel for internal-combustion engines.

III. 1542 (1933). I. G. Farbenind. *See* IV.

1817 (1933) I. G. Farbenind. *See* VII.

1944 (1933). Soc. Chem. Ind. in Basle. Manufacture of sulphonic acids of the terpene series.

IV. 1542 (1933). I. G. Farbenind. Manufacture of dyes and intermediates therefor, and photographic emulsions sensitized therewith.

1676 (1933). I. G. Farbenind. *See* VI.

V. 1712 (1933). Soie Artific. de Gand Soc. Anon. and Luft. Treating artificial materials obtained from viscose.

1826 (1933). Boehringer & Soehne. Manufacture of artificial silk, films, plastic masses, intermediate layers for safety glass, lacquers, etc.

20,606 (1933). Geigy A.-G. *See* VI.

VI. 1676 (1933). I. G. Farbenind. Manufacture of water-insoluble azo-dyestuffs on the fibre.

20,606 (1933). Geigy A.-G. Dyeing acetylcellulose and mixed materials containing it.

VII. 402 (1933). Grah. *See* XVI.

1292 (1933). Lawarree. Manufacture of alkali nitrates.

1817 (1933). I. G. Farbenind. Manufacture of chromic hydroxide and organic oxidation products.

VIII. 1826 (1933). Boehringer & Soehne. *See* V.

IX. 1839 (1933). Koch. Production of bituminous compositions.

X. 36,244 (1932). Internat. Pulverizing Corp. *See* I.

493 (1933). Verein. Stahlwerke. Production of non-embrittling iron and steel.

XIII. 36,956—7 (1932). Bonnot Co. Plastic material manufacture.

850 (1933). Denzler. Manufacture of printing inks.

1719 (1933). Rotterdamsche Handel- en Crediet-Maats. Manufacturing artificial masses.

1826 (1933). Boehringer & Soehne. *See* V.

1903 and 19,883 (1933). Resinous Products & Chem. Co. Composition of matter.

XVI. 402 (1933). Grah. Fertilizing salts.

1695—9 (1933). Kappen. Production of composite fertilizers.

XIX. 984—90 (1933). I. G. Farbenind. Preservation of green fodder.

1677—8 (1933). Delta Techn. Verkehrs.-A.G. Methods of baking and leavening preparations for use therewith.

XX. 1944 (1933). Soc. Chem. Ind. in Basle. *See* III.

XXI. 1542 (1933). I. G. Farbenind. *See* IV.

1830 (1933). I. G. Farbenind. Sensitizing photographic silver halide emulsions.

XXII. 26,239 (1932). Földi and König. Matches.

XXIII. 1812 (1933). Austerweil and Jeanprost. Purification and/or sterilization of liquids by means of base exchangers.

GENERAL NOTES

Official Trade Intelligence

The Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1, has received the following inquiries for British goods. British firms may obtain further information by applying to the Department stating the specific number. *Egypt:* Tinplate (134). *Italy:* Heavy chemicals (129). *Rumania:* Dyes and chemicals for textile and industrial purposes, oils, fats, waxes, and resins (130). *South Africa:* Disinfectant fluid (F.Y. 1820): Linseed oil (B.Y. 7627).

Dyestuffs (Import Regulation) Act, 1920

The following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during July has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 645, of which 583 were from merchants or importers. To these should be added the 3 cases outstanding on June 30, making a total for the month of 648. These were dealt with as follows: Granted 634 (of which 624 were dealt with within 7 days of receipt); referred to British makers of similar products, 7 (of which 5 were dealt with within 7 days of receipt); outstanding on July 31, 7. Of the total of 648 applications received, 629 or 97% were dealt with within 7 days of receipt.

Official Statistics

The annual Guide to Current Official Statistics provides a very necessary key to the storehouse of statistical information contained in the hundreds of surveys, periodicals, returns, and reports on a wide range of subjects which are published each year by Government departments. It gives not only a list of the titles and prices of official publications containing statistics but also an extensive alphabetical index showing the nature and scope of the information available on each subject.

Volume 11 of the Guide (price 1s. 5d. net, post free) has just been issued, and may be obtained direct from the sale offices of H.M. Stationery Office or through any bookseller.

PUBLICATIONS RECEIVED

"SHIRLACROL," A NEW PHENOLIC WETTING AGENT. By G. T. Morgan, F.R.S., D. D. Pratt, and A. E. J. Pettet. Department of Scientific and Industrial Research. Reprinted from the "Dyer and Calico Printer," May, 1933.

ANNUAL REPORT OF THE CHIEF INSPECTOR OF FACTORIES AND WORKSHOPS FOR THE YEAR 1932. Pp. 134. London: H.M. Stationery Office, 1933. 2s.

CHEMISTRY OF ORGANIC COMPOUNDS: A YEAR'S COURSE IN ORGANIC CHEMISTRY. By J. B. Conant. Pp. x + 623. New York: Macmillan Co., 1933. 20s.